

What is claimed is:

1. A magnetoresistive head comprising a magnetoresistive layer which converts magnetic signals to electric signals, a pair of electrodes for allowing an electrically sensing current to flow across said magnetoresistive layer, upper and under gap layers placed over and beneath said pair of electrodes and said magnetoresistive layer, and upper and under shield layers, one of which placed over said upper gap layer and the other placed beneath said under gap layer, wherein said pair of electrodes and at least either of said upper and under shield layers are electrically connected by varistor material that also interconnects said pair of electrodes.

2. A magnetoresistive head comprising a magnetoresistive layer which converts magnetic signals to electric signals, a pair of electrodes for allowing an electrically sensing current to flow across said magnetoresistive layer, upper and under gap layers placed over and beneath said pair of electrodes and said magnetoresistive layer, and upper and under shield layers, one of which placed over said upper gap layer and the other placed beneath said under gap layer, wherein at least either of said upper and under gap layers is made of varistor material.

3. A magnetoresistive head comprising a magnetoresistive layer which converts magnetic signals to electric signals, a pair of electrodes for allowing

an electrically sensing current to flow across said  
magnetoresistive layer, upper and under gap layers  
placed over and beneath said pair of electrodes and  
said magnetoresistive layer, and upper and under shield  
5 layers, one of which placed over said upper gap layer  
and the other placed beneath said under gap layer,  
wherein leads of said upper and under shield layers and  
leads extended out of lead terminals of said electrodes  
are connected by varistor material on the side where a  
10 magnetoresistive element does not exist, when viewed  
from the lead terminals of said pair of electrodes.

4. The magnetoresistive head according to claim 1,  
wherein said magnetoresistive head employs a material  
consisting of ZnO, SiC, BaTiO, Si, or SrTiO films or  
15 films whose main element is one of these substances as  
said varistor material.

5. The magnetoresistive head according to claim 2,  
wherein said magnetoresistive head employs a material  
consisting of ZnO, SiC, BaTiO, Si, or SrTiO films or  
20 films whose main element is one of these substances as  
said varistor material.

6. The magnetoresistive head according to claim 3,  
wherein said magnetoresistive head employs a material  
consisting of ZnO, SiC, BaTiO, Si, or SrTiO films or  
25 films whose main element is one of these substances as  
said varistor material.

7. The magnetoresistive head according to claim 1,  
wherein said magnetoresistive head employs a material

which exhibits varistor characteristics and is multi-layered structure made up of  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Bi}_2\text{O}_5$ ,  $\text{MnO}$ ,  $\text{NiO}$ ,  $\text{CoO}$ ,  $\text{Fe-O}$ ,  $\text{TiO}_2$ ,  $\text{HfO}_2$ ,  $\text{ZrO}_2$ , or  $\text{Nb}_2\text{O}_5$  films or oxide films whose main element is one of these substances in combination with films selected from among  $\text{ZnO}$ ,  $\text{SiC}$ ,  $\text{BaTiO}$ ,  $\text{Si}$ , and  $\text{SrTiO}$  films as the above varistor material.

8. The magnetoresistive head according to claim 2, wherein said magnetoresistive head employs a material which exhibits varistor characteristics and is multi-layered structure made up of  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Bi}_2\text{O}_5$ ,  $\text{MnO}$ ,  $\text{NiO}$ ,  $\text{CoO}$ ,  $\text{Fe-O}$ ,  $\text{TiO}_2$ ,  $\text{HfO}_2$ ,  $\text{ZrO}_2$ , or  $\text{Nb}_2\text{O}_5$  films or oxide films whose main element is one of these substances in combination with films selected from among  $\text{ZnO}$ ,  $\text{SiC}$ ,  $\text{BaTiO}$ ,  $\text{Si}$ , and  $\text{SrTiO}$  films as the above varistor material.

9. The magnetoresistive head according to claim 3, wherein said magnetoresistive head employs a material which exhibits varistor characteristics and is multi-layered structure made up of  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Bi}_2\text{O}_5$ ,  $\text{MnO}$ ,  $\text{NiO}$ ,  $\text{CoO}$ ,  $\text{Fe-O}$ ,  $\text{TiO}_2$ ,  $\text{HfO}_2$ ,  $\text{ZrO}_2$ , or  $\text{Nb}_2\text{O}_5$  films or oxide films whose main element is one of these substances in combination with films selected from among  $\text{ZnO}$ ,  $\text{SiC}$ ,  $\text{BaTiO}$ ,  $\text{Si}$ , and  $\text{SrTiO}$  films as the above varistor material.

10. The magnetoresistive head according to claim 7, wherein said material is formed in a multi-layer wherein the thickness of a film made of  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,

Ta<sub>2</sub>O<sub>5</sub>, Bi<sub>2</sub>O<sub>5</sub>, MnO, NiO, CoO, Fe-O, TiO<sub>2</sub>, HfO<sub>2</sub>, ZrO<sub>2</sub>, or Nb<sub>2</sub>O<sub>5</sub> or an oxide film whose main element is one of these substances is 5 nm or less.

11. The magnetoresistive head according to claim 8,

5 wherein said material is formed in a multi-layer wherein the thickness of a film made of Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Ta<sub>2</sub>O<sub>5</sub>, Bi<sub>2</sub>O<sub>5</sub>, MnO, NiO, CoO, Fe-O, TiO<sub>2</sub>, HfO<sub>2</sub>, ZrO<sub>2</sub>, or Nb<sub>2</sub>O<sub>5</sub> or an oxide film whose main element is one of these substances is 5 nm or less.

10 12. The magnetoresistive head according to claim 9, wherein said material is formed in a multi-layer wherein the thickness of a film made of Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Ta<sub>2</sub>O<sub>5</sub>, Bi<sub>2</sub>O<sub>5</sub>, MnO, NiO, CoO, Fe-O, TiO<sub>2</sub>, HfO<sub>2</sub>, ZrO<sub>2</sub>, or Nb<sub>2</sub>O<sub>5</sub> or an oxide film whose main element is one of these substances is 5 nm or less.

15 13. A magnetic head assembly comprising the magnetoresistive head according to claim 1 in combination with an inductive thin-film head.

20 14. A magnetic head assembly comprising the magnetoresistive head according to claim 2 in combination with an inductive thin-film head.

15. A magnetic head assembly comprising the magnetoresistive head according to claim 3 in combination with an inductive thin-film head.

25 16. A magnetic read/write device with the magnetic head assembly according to claim 13 installed thereon.

17. A magnetic read/write device with the magnetic head assembly according to claim 14 installed thereon.

18. A magnetic read/write device with the magnetic head assembly according to claim 15 installed thereon.

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